Ten Eyck Road Bridge
Spanning Sugar River on Ten Eyck Road
Brodhead Vicinity
Green County
Wisconsin

HAER No. WI-94



PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Historic American Engineering Record
National Park Service
Great Lakes System Office
1709 Jackson Street
Omaha, Nebraska 68102-2571

HAER NO. WI-94

# HISTORIC AMERICAN ENGINEERING RECORD

## TEN EYCK ROAD BRIDGE

Location: Ten Eyck Road over the Sugar River
Brodhead Vicinity, Green County, Wisconsin

USGS Brodhead West Quadrangle, Universal Transverse Mercator Coordinates: Zone 16 Easting 303280 Northing 4720310

Present Owner: Town of Decatur

Present Use: Vehicular bridge

Significance: The Ten Eyck Road Bridge is a single lane, two span Pratt Standard pony truss that was erected in 1907. Built by the Elkhart Bridge and Iron Company of Elkhart, Indiana, the structure was identified in *Cultural Resource Management in Wisconsin* (the state's cultural resource management plan) as one of the state's two best examples of that bridge type. As well, *Cultural Resource Management* identifies the Elkhart Bridge and Iron Company as a prolific bridge builder in the state.[1] With its integrity largely intact, the Ten Eyck Road Bridge is significant as an excellent example of an early twentieth century Pratt Standard pony truss that was built by a prominent regional bridge building company.

## PART I. HISTORICAL INFORMATION

A. Physical History:

1. Date of erection: 1907[2]

2. Architect: Unknown

3. Original and subsequent owners: Public ownership.

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[1]Barbara Wyatt, ed., *Cultural Resource Management in Wisconsin*, Vol. 2 (Madison: State Historical Society of Wisconsin, Historic Preservation Division, 1986), Transportation, 12/9, 12/23.

[2]Ten Eyck Road Bridge Plate, photograph on file at Heritage Research, Ltd., Menomonee Falls, WI.

4. Builder: Elkhart Bridge and Iron Company[3]

5. Alterations and additions: The historical integrity of this structure is generally good, although a few members have been replaced. Specifically, the bottom chords in panel six of the western span have been replaced, as has one of the paired diagonals in panel five of the same span.

B. Historical Context:

COUNTY & LOCAL AREA HISTORY

The first whites in present-day Green County arrived in 1827 and traded with the Indians in the area. The first permanent white settler was William Deviese. He built a smelting furnace in 1829. Although the area's mining potential drew many settlers, especially once order was restored after the 1832 Black Hawk War, it was agricultural potential that really prompted the county's growth. In 1838, there were 494 people in Green County. This figure grew to 933 by 1840, to 8,566 by 1850 and to 19,808 by 1860. Many of these people were involved in farming. Of the county's 373,857 acres, only 135,081 acres were devoted to farming in 1850. But, by 1870, there were 2,631 farms occupying 338,360 acres, and in 1890, there were 2,475 farms utilizing 346,621 acres. These farms produced substantial amounts of wheat, hay, corn, oats and barley over time, as well as raised many swine, sheep and cattle.[4]

As the agricultural industry grew, so did the need for agricultural support communities--towns that would provide the services farmers needed to mill, sell and ship their produce, as well as provide the supplies needed to survive on their farms. In Green County's Decatur Township, the Village of Brodhead was particularly significant. Up until 1857, the Village of Decatur was the primary support community, offering two blacksmith shops, two hotels, a wagon shop and a shoe shop. But in 1857, the village's four hundred inhabitants refused to allocate $7,000 for a railroad--a decision that largely doomed the small community. It was surpassed by Brodhead, the area through which the railroad was built.[5]

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[3]Ibid.

[4]*History of Green County, Wisconsin* (Springfield, IL: Union Publishing Company, 1884), 151-54; Helen M. Bingham, *History of Green County* (Milwaukee: Burdick & Armitage, 1877), 46; *State of Wisconsin: 1985-1986 Blue Book* (Madison: State of Wisconsin, 1985), 711; *A Century of Wisconsin Agriculture, 1848-1948* (Madison: Wisconsin Crop and Livestock Reporting Service, 1948), 87.

[5]Bingham, *History of Green County*, 53-54.

The Village of Brodhead is located east of the Sugar River, which was an early power source for some of the fledgling commercial center's business ventures. Brodhead was laid out in the spring of 1856 by E.H. Brodhead, E.D. Clinton, I.F. Mack, John P. Dixon, E.A. West and J.L.B. Thomas. Due to the efforts of Clinton and local farmers who needed to tap into more distant markets, the railroad reached Brodhead in 1857. As a result, the village grew very rapidly, attaining a population of over six hundred by early 1858. Thus, established as the railroad center in the area, Brodhead provided farmers with transportation, in addition to other agriculturally-related facilities.[6]

The village had an ample supply of general merchants and, consequently, was able to meet the basic needs of the surrounding community. One of the first businesses to attempt to develop the water power of the nearby Sugar River was the Hendrie, Steward & Pierce flour mill, built in 1863. Before the mill could operate, an almost three-mile-long mill race had to be built from the old mill dam in Decatur. This race also served other agriculturally-related industries, including several wagon shops, the Carpenter & Rood foundry (later the Carpenter & Campbell machine shop) and the Norwegian Plow Company, established by W.A. Wheaton and others in 1874. Also serving the community were a tobacco factory established by William M. Fleek in 1880 and the Brodhead Dairy Company, organized in 1882. The latter produced 75,000 pounds of butter in its first year.[7]

The Village of Brodhead notwithstanding, the Town of Decatur was largely rural. It was organized in 1849, and its first settlers included John Moore, Thomas Chambers and John J. Dawson, among others. These early settlers became familiar with a large tract of land that came to be known as Jordan's Prairie, which stretched from the northwest (Section 6) to the southeast (Sections 27 and 28). It was noted that "the soil of this prairie consists of a rich loam mixed with sand, and is superior com land. It also produces excellent crops of small grain and grass, and on the whole, is not excelled perhaps in the State for its general excellence."[8] Indeed, the town's soil seemed to be well-suited for com production. In 1876, the Town of Decatur devoted 4,856 acres to the crop--more than any other town in the county. The town's farmers also planted 846 acres in wheat, 3,258 in oats and 189 in rye in 1876. Due largely to the agricultural development of Decatur, the town's population grew from 558 in

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[6]Ibid., 54-55; *History of Green County*, 787, 802.

[7]Bingham, *History of Green County*, 55-56; *History of Green County*, 804-806, 810-13.

[8]*History of Green County*, 787-88.

1850 to about 1,618 in 1860, after which it fell back to 911 in 1870 and 701 in 1875.[9]

The Ten Eyck Road Bridge evolved within this general historical context to provide access across the Sugar River.

## TRUSS BRIDGES IN WISCONSIN

The two most commonly found types of truss bridges are the Pratt and Warren. These two classifications are further subdivided into pony or low trusses, overhead or through trusses and deck trusses. The Warren truss, which two British engineers patented in 1840, placed nominal stress on the vertical members, while the diagonals served as both tension and compression members. Caleb and Thomas Pratt patented the Pratt truss in 1844, incorporating vertical compression members and diagonal tension members. During the nineteenth century, the Pratt truss seemed to be more popular because it used less iron and was easier to erect. In the 1870s, numerous variations in the Pratt design were introduced for long span bridges. To save money and material, engineers "bent" the top chord into a polygonal configuration, thereby creating a Parker truss. If the top chord had exactly five sides, it was called a "camelback" truss. The increased live loads of railroad locomotives and rolling stock necessitated further design innovations. The addition of substruts and/or subties greatly fortified truss bridges and transformed a Pratt into a Baltimore and a Parker into a Pennsylvania truss--the latter considered a "major advance in strengthening the Pratt truss." Another development which sparked much debate around the tum-of-the-century involved the merits of pin connections versus riveted connections for main truss members. Proponents of riveted bridges cited the advantages of increased structural rigidity and the reduction of damaging vibrations; advocates of pin-connected bridges emphasized the theoretically correct stress distribution and the smaller amount of required metal. Although no dramatic resolution occurred, a compromise of sorts was reached in the early twentieth century. Riveted bridges were designed with less duplication of members, and pin-connected bridges, suitably detailed, were still accepted for long span highway bridges.[10]

These developments affected Wisconsin bridge construction, but other circumstances were equally important. Until the latter nineteenth century, individual bridge companies were largely responsible for bridge design. Consequently, there was little, if any, standardization of design, although Pratt truss bridges seemed to predominate.

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[9]Bingham, *History of Green County*, 42, 46.

[10]Jeffrey Hess, Robert M. Frame, III, Robert S. Newbery and John N. Vogel, "Bowen Mill Bridge," Historic American Engineering Record (HAER) Report, HAER No. WI-67 (1992): 3-5. On file at the Library of Congress, Washington, D.C.

Indeed, the state's oldest truss bridge, the 1877 White River Bridge in Burlington, is a Pratt. The Good Roads Movement of the late 1890s and early 1900s, however, prompted a dramatic shift regarding bridge design by promoting greater involvement on the part of local officials and, especially, the state government. In 1907, the state legislature established a Highway Division with the Wisconsin Geological and Natural History Survey to conduct experiments in road design and to provide professional advice to local governments about specific projects.[11]

The following year, Wisconsin voters overwhelmingly removed the greatest obstacle to creating a progressive statewide system of bridge and highway construction by eliminating the state's constitutional prohibition against direct state aid to transportation projects. In 1911, the legislature made its first appropriation for highway improvements. In addition, it transformed the Highway Division into an autonomous State Highway Commission (SHC), responsible for overseeing the expenditure of state funds for the development of a state highway network.[12]

The SHC emphasized the use of standardized plans for various types of bridges and culverts. Prior to this time, metal truss bridges dominated crossings of all lengths. After 1911, however, the SHC promoted the construction of girder, beam or slab spans of steel and/or concrete for short crossings (less than thirty-five feet). The SHC particularly favored concrete spans, citing the advantages of lower cost, greater compatibility with aesthetic treatment and greater adaptability to remodeling, especially in terms of roadway widening. Despite its predilection for concrete bridges, the SHC continued to design truss bridges for spans of thirty-six feet or more. The riveted Warren became the state's standard pony design. Indeed, this design became the state's most common type of highway truss bridge. Of the approximately 450 Warren trusses in the state in 1980, over four-fifths were riveted pony trusses built according to SHC standard plans. The SHC also drafted a standard plan for riveted, overhead Pratt trusses. In the first three and one-half years of its work, the SHC designed over fifteen hundred bridges of all types. Practically all the local bridges in the state during these years were either designed by the SHC or were based on SHC standard plans. The SHC continuously revised its truss designs, drawing upon the latest engineering information. In the 1930s, the SHC made a major commitment to keeping its standardized plans up to date by dropping the Pratt design in favor of the Warren for all overhead truss configurations. Although concrete designs eventually dominated bridge construction, metal truss bridges remained cost effective in many situations. Consequently, the SHC continued to

[11]Ibid., 5-6.

[12]Ibid., 7.

design truss bridges until well after World War II.[13]

The number of highway truss bridges in Wisconsin has dwindled substantially over the years. Under the sponsorship of the State Historic Preservation Office (SHPO) of the State Historical Society, George Danko initiated the first systematic study of Wisconsin truss bridges in 1976. By 1980, when WisDOT established the Historic Bridge Advisory Committee (HBAC), seventeen bridges had been listed or found eligible for listing on the National Register of Historic Places. The HBAC pursued the statewide inventory of truss bridges, which then accounted for approximately one-tenth of the state's 10,386 surviving highway bridges built before 1950.[14]

The HBAC identified an initial pool of 996 pre-1941 truss bridges that represented seventeen structural types. The HBAC screened this pool to identify the following for each truss type: those bridges which had the earliest known construction dates; those in the best condition; bridges with the best available historical data; and those with the most noteworthy features. Also considering bridges in park settings, this winnowing process reduced the initial pool to 247. The most significant bridges within each truss category were determined by applying criteria--modified as necessary--that were developed in a Virginia study. The evaluation process yielded a final group of fifty-three bridges deemed potentially eligible for the National Register. Historians Jeffrey A. Hess and Robert M. Frame, III, contracted to complete a field survey and compile historical data for those bridges in 1986. The final survey totaled fifty-four bridges, including two already listed on the National Register (P-18-720 and P-53-162).[15]

## THE TEN EYCK ROAD BRIDGE

Among the early settlers who came to the Town of Decatur was J. Ten Eyck. Acquiring land in Sections 34 and 35 in 1839, he began improving it in 1859. The Ten Eyck farm remained in the family well into the 1920s, and was located adjacent to the road, and subsequently, the bridge that bear the family name.[16]

The history of this site as a bridge location is traceable to the latter half of the

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[13]Ibid., 7-8.

[14]Ibid., 8-9.

[15]Ibid., 9-10.

[16]*History of Green County*, 801; *Map of Green County Wisconsin* (Monroe, WI: J.T. Dodge, 1861); *Plat Book of Green County, Wisconsin* (Rockford, IL: W.W. Hixson & Son, 1924[?]).

nineteenth century. The aforementioned Jordan's Prairie was located west of Brodhead, across the Sugar River. Consequently, bridges were needed to facilitate passage between the rich agricultural land to the west and the commercial and shipping community to the east. The earliest available map indicates that there was no river crossing at the Ten Eyck Road Bridge site in 1861, although there was one about one mile north and another structure about one-half mile north of that. These two crossings likely served the early farmers well, but by the early 1870s, much of the woods south of Jordan's Prairie was probably cleared and being farmed--by J. Ten Eyck, among others. Agricultural development in Sections 33, 34 and 35 meant that farmers had to travel at least a mile out of their way to cross the river by means of the southernmost of the two 1861 bridges. While a bridge is identified on an 1873 map at the present-day Ten Eyck Road Bridge site, little is known about that early structure.[17]

The contract for the 1907 Ten Eyck Road Bridge was awarded to W.E. Gifford of the Elkhart Bridge Company at a cost of $3,333.33.[18] The Elkhart Bridge Company, of Elkhart, Indiana, was incorporated in November 1901 by Frank Brumbaugh and John Fieldhouse. At the time, Brumbaugh was an agent for the Bellefontaine Bridge Company of Ohio, while Fieldhouse was an Elkhart industrialist who wanted to boost the local economy. Early growth was slow, and the company did not prosper until after it was reorganized as the Elkhart Bridge and Iron Company in 1906. By 1910, it had 125 employees and was earning $40,000 annually.[19]

One of the firm's agents was Willis E. Gifford, who maintained that position for a quarter of a century. Born in New York in 1867, Gifford married and moved to Michigan before coming to Wisconsin. Arriving in Madison around 1900, he

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[17] *Map of Green County* (1861); *Atlas of Green County Wisconsin* (Madison: Harrison & Warner, 1873); *The Brodhead Independent*, 18 July 1907.

[18] "Bridge Committee Closes Deals for Three Bridges," in *The Brodhead Register*, 2 January 1907.

[19] Elkhart Bridge and Iron typically erected its structures in the shop, after which they were disassembled and shipped to the purchaser. The company prided itself on the ornamental features of its bridges, although the surviving Wisconsin examples of Elkhart bridges do not display much ornamentation. The company began to diversify into other structural work almost as soon as it was reorganized, and the fabrication of buildings became an increasingly important part of its business. James L. Cooper, *Iron Monuments to Distant Posterity: Indiana's Metal Bridges, 1870-1930* (Greencastle, IN: DePauw University, 1987), 29-30. Curiously, Elkhart Bridge and Iron is not mentioned in either Anthony Deahl, ed., *A Twentieth Century History and Biographical Record of Elkhart County, Indiana* (Chicago: Lewis Publishing, 1905), 235-42 or Abraham E. Weaver, ed., *A Standard History of Elkhart County, Indiana*, Vol. 1 (Chicago: American Historical Society, 1916), 268-75.

traveled extensively, selling road graders and other machinery.[20] Soon thereafter, Gifford became an agent for Elkhart Bridge and Iron, although until 1916, he identified himself in the census and city directories simply as a traveling salesman.[21] Having sold bridges since at least 1905, Gifford was subsequently known as a "bridge contractor."[22] He advertised himself as an agent for Elkhart Bridge and Iron until 1931.[23]

Most of Gifford's early bridges were pony trusses, either pin-connected Pratts or riveted Warrens. The longest bridge he contracted for was a 150 foot Pratt overhead, although he did arrange for repair work on some larger structures.[24] Gifford apparently was a resourceful and aggressive agent, but he never made very much money at bridge building.[25] He built as many as seventy bridges in one year before World War I, but the number dropped drastically during the 1920s. Although the Elkhart Bridge and Iron Company apparently survived at least the early years of the

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[20]United States, Department of Commerce, Bureau of Census (hereafter cited as USDC.BC), *Twelfth Federal Census of the United States, 1900* (Washington, D.C.: U.S. Government Printing Office, 1900), Enumeration District 46, Sheet 1, Line 62; USDC.BC, *Thirteenth Federal Census of the United States, 1910* (Washington, D.C.: U.S. Government Printing Office, 1910), Enumeration District 64, Sheet 6, Line 94; Willis E. Gifford, Jr., interview on behalf of the Historic Bridge Advisory Committee, 5 October 1987.

[21]*Madison City Directory* (Madison: G.R. Angell & Company, 1902), 172; *Madison City Directory* (Madison: G.R. Angell & Company, 1904), 135; *Madison City Directory* (Madison: G.R. Angell & Company, 1907), 144; *Madison City Directory* (Madison: G.R. Angell & Company, 1909), 157; *Madison City Directory* (Madison: G.R. Angell & Company, 1911), 179; *Madison City Directory* (Madison: G.R. Angell & Company, 1914), 187.

[22]Contained within the Gifford Photograph Album is a list of bridges that starts with the year 1905 and indicates the number 82--suggesting that Gifford contracted for quite a number of bridges before 1905. There are some discrepancies, however, between the typed lists found and two different sets of labels on the photographs. Gifford Photograph Album, in possession of Willis Gifford, Jr.

[23]*Madison City Directory* (Madison: G.R. Angell & Company, 1916), 184, 627; *Madison City Directory* (Madison: Madison Directory Company, 1916), 301; *Madison City Directory* (Milwaukee: Wright Directory Company, 1931), 326.

[24]Little is known about how Gifford operated, but according to his son, he was never involved in the actual construction. Rather, Gifford attended lettings and arranged for contracts. Once he had a contract, he advised the company and hired a foreman--most often Ed Rudd, George Sarbarker or H.C. "Duff" Fagan. The foreman then hired the crew and directed the actual erection. In addition, Gifford apparently built I-beam bridges as early as 1905. These would probably have been less than 20 feet in length. What involvement--if any--the Elkhart Bridge and Iron Company had in these very small structures is not known. The earliest evidence found concerning a concrete girder bridge associated with Gifford is a photograph of a 1914 bridge in Dane County, Wisconsin. Gifford Photograph Album; Gifford, Jr., interview.

[25]Gifford's son indicated his father paid for sending him to Lake Forest Academy for one year of high school. Gifford, Jr., interview.

Depression, Gifford built only one bridge in 1929, and that may have been his last.[26] He died in Madison during the 1940s.[27]

As certain details of Gifford's career with Elkhart Bridge and Iron are sketchy, information regarding the company's construction of the Ten Eyck Road Bridge are similarly vague. After Elkhart Bridge and Iron was selected to erect the bridge, the old structure at the site was sold to Walt Douglas and William Lake, who began to tear it down in late May 1907. Material for the new steel bridge began to arrive during demolition. By 18 July, the steel portion of the new bridge was completed, although the planks for the floor had not yet been delivered. There is no available account regarding the official opening of the bridge; however, construction was completed by the end of 1907.[28]

Since there was another bridge one mile to the north, it is clear that the Ten Eyck Road Bridge was not an indispensable link in the area's transportation system. Rather, the structure likely evolved as a crossing of convenience for the farmers that traveled to Brodhead from the south and southwest. As such, it was built to help serve and maintain a significant, county-wide industry.

## PART II. ARCHITECTURAL INFORMATION

A. General Statement:

1. Architectural character: The Ten Eyck Road Bridge was built in 1907. It is a two span, Pratt Standard pony truss. Each span contains six panels.

2. Condition of fabric: The historic fabric of this structure is generally good; however, several bottom chord members in the west span, in addition to one element of a hip vertical in the same span, have been replaced.

B. Description:

With an 89 foot 11 inch east span and a 90 foot 1 inch west span, the overall length

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[26]Frank J. Miller, who succeeded Brumbaugh as president, held that position "well beyond 1930." Cooper, *Iron Monuments*, 29; Gifford Photograph Album.

[27]Gifford's son could not remember the exact year of death, but he calculated it would have been shortly after World War II. Gifford, Jr., interview.

[28] *The Brodhead Independent*, 30 May 1907; 18 July 1907.

of the Ten Eyck Road Bridge is 180 feet, while the width of its single lane traffic deck is 15 feet 6.5 inches. The structure is anchored on six concrete-filled, 3 foot 6 inch diameter, steel cylinders. Steel plates are set between and welded to the cylinders in such a fashion that a solid wall is created. The concrete deck of each span is carried by five, 15 inch by 5.5 inch rolled "I" beams. Perpendicular to the floor beams are eleven stringers. The two outer stringers are 6 inch by 2 inch channels, while those in between are 6 inch by 3.25 inch rolled "I" beams. The bottom lateral bracing is comprised of 1.18 inch rods that are threaded and bolted.

Floor beams are hung from 14 inch by 5.25 inch hip and intermediate verticals, each of which is fabricated from 2 inch angles back-to-back with lacing. The inclined endposts and top chords are 14 inches by 8.25 inches and fabricated from 8 inch channels, coverplates and lacing. Diagonal member dimensions vary with each panel. Those in panels two and five (counted from east to west) consist of paired, 2 inch by .87 inch bars, while those in panels three and four are paired, 1.5 inch by .62 inch bars with a 1 inch rod with screwbuckels that extend from the opposite corners and cross them. Bottom chords are paired, rectangular eyebars, the sizes of which also vary with each panel. Those in panels one, two, five and six are 2.75 inch by .75 inch bars, and those in panels three and four are 3.5 by 1 inch bars.

All major connections are pinned.

The bridge has no ornamentation. It does, nevertheless, have a two course railing comprised of 4 inch by 1.5 inch channels on each side of the traffic deck. The top course is 33.5 inches above the deck.

C. Setting:

The bridge is located in the Town of Decatur, at that point where Ten Eyck Road crosses the Sugar River. The area around the bridge, the latter being oriented on a west northwest/south southeast axis, is all rural. Farm fields are northeast and northwest of the structure, while a small recreational trailer park is to the southwest and a single house is to the southeast. The City of Brodhead is approximately 2/3 mile to the east.

## PART III. SOURCES OF INFORMATION

A. Bibliography:

1. Primary or unpublished sources:

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*The Brodhead Independent*. Various dates.

Gifford Photograph Album. In possession of Willis Gifford, Jr.

Gifford, Willis E., Jr. Interview on behalf of Historic Bridge Advisory Committee, 5 October 1987.

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Ten Eyck Road Bridge Plate. Photograph in possession of Heritage Research, Ltd., Menomonee Falls, WI.

2. Secondary and published sources:

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_____. *Thirteenth Federal Census of the United States, 1910.* Washington, D.C.: U.S. Government Printing Office, 1910.

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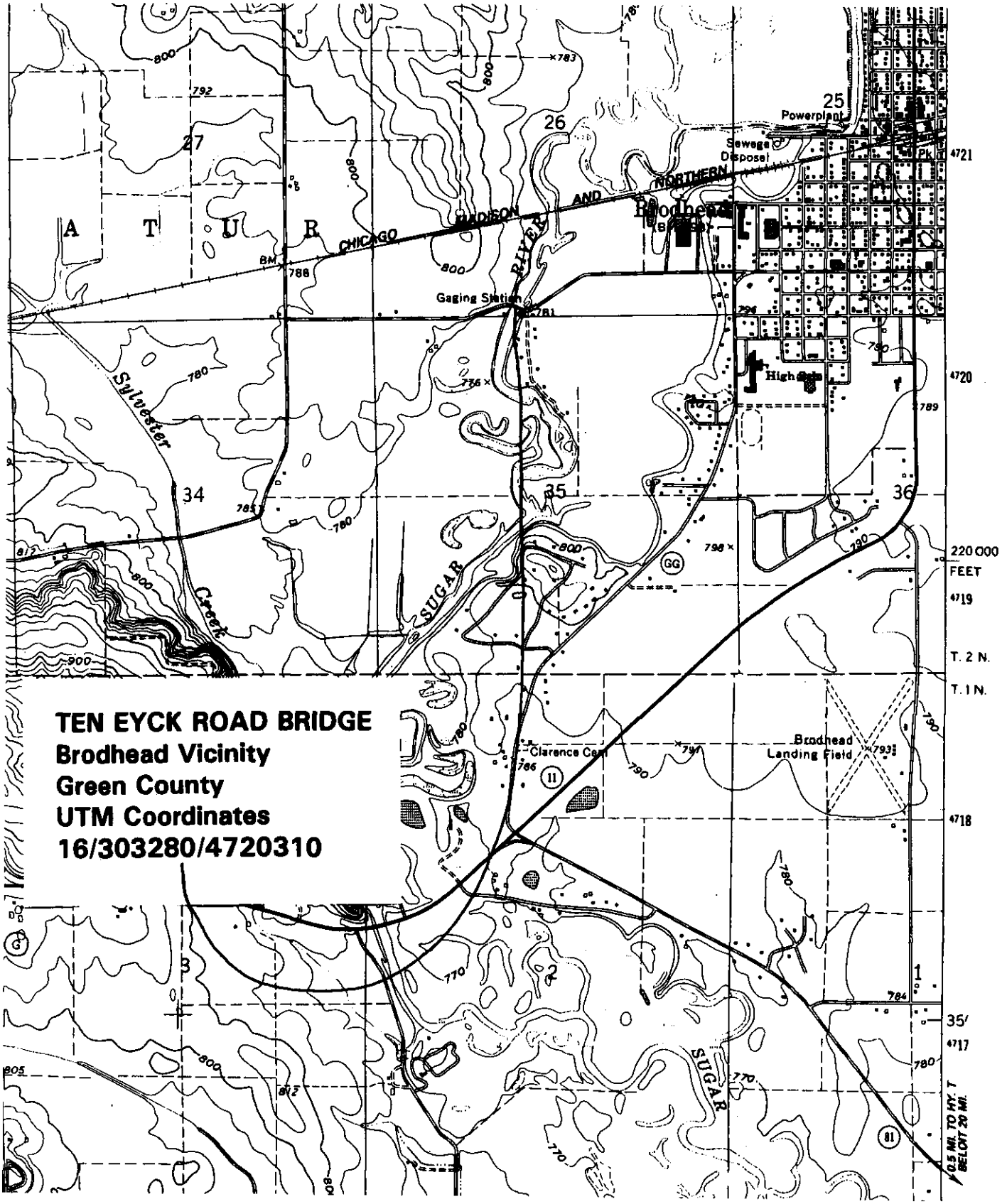
Prepared by:

John N. Vogel, Ph.D.
Heritage Research, Ltd.
N89 W16785 Appleton Avenue
Menomonee Falls, Wisconsin
1 July 1996

PART IV. PROJECT INFORMATION

This project has been sponsored by the Wisconsin Department of Transportation. Mid-State Associates, consulting engineers in Madison, Wisconsin, formally acted as the contracting agency. The project was directed by Dr. John N. Vogel, Principal Investigator and Sr. Historian for Heritage Research, Ltd. (HRL), who provided the photographic documentation and the architectural/technical data. He also edited and prepared the final document. The general truss bridge context, as well as the information on the Elkhart Bridge and Iron Company, was originally prepared by Jeffrey Hess, Robert Frame, III, and Robert Newbery in a report for the Wisconsin Department of Transportation. That context was edited and summarized by Dr. Kevin Abing, who also prepared the local contextual information. David J. Vogel assisted during the photographic activities associated with this project.


TEN EYCK ROAD BRIDGE
Brodhead Vicinity
Green County
UTM Coordinates
16/303280/4720310
Brodhead
Powerplant
Sewage Disposal
NORTHERN
MADISON AND CHICAGO
RIVER
Gaging Station
High Sch
Sylvester
Creek
SUGAR
Clarence Cem
Brodhead Landing Field
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